

# **The Results of Energy Audit and Its Achievements in Taiwan**

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## **I. Introduction**

In the wake of the first energy crisis, Chinese Taipei government felt that the proportion of indigenous energy is too low and energy conservation could be brooked no delay. Consequently, energy-related policies have been implemented, and the government, industries, academic and research institutes were assembled together in order to conduct the guidance of energy conservation in the industrial circles. At the meantime, energy conservation technology was being actively introduced, researched and developed, and promoted. In addition, energy audit was conducted in accordance with the "Energy Management Law". Since 1986, Chinese Taipei has established the energy audit system and pressed ahead with the implementation of energy management in factories. Since 1991, Chinese Taipei has been entrusted to carry out the energy audit on large energy users. And since 2000, on-site energy audit has been carried out with the Top 100 large energy users in order to aggressively give assistance and guidance to large energy users for the promotion of energy savings. All of these were expected to enhance energy efficiency to achieve the energy-saving goals: accumulating 16% saved energy in 2010 and 28% in 2020.

## **II. Energy Audit System**

According to the "Energy Management Law" of Chinese Taipei, energy users reaching the following regulated energy consumptions shall set up an energy audit system and draw up energy-saving goals and implementation plans, both of which shall be submitted along with their energy audit systems to the Energy Commission in charge for approval.

- Contracted electricity consumption more than 1,000 kW
- Coal consumption more than 6,000 MT annually
- Fuel oil consumption more than 6,000 KL annually
- Natural gas consumption more than 10 million cubic meters annually

The aforementioned energy audit system includes: an energy audit dedicated agency, energy procedure analysis, monitoring and test instruments and gauges, periodic inspections on the efficiency of each energy consuming equipment, energy consumption statistics, the unit energy consumption for the manufacturing industries, and so forth. Each year, by the end of January, large

energy users shall collect their previous year's energy use information and report energy type and its sources, energy consumption quantities, energy storage quantities, gross production, unit energy consumption and the energy-saving rates.

### **III. Promote Large Energy Users to Execute Energy Audit**

Chinese Taipei has executed an energy audit program, actively given an impetus to large energy users to establish their energy audit systems, as well as provided energy conservation technology and information. Since 2000, the on-site audit on the Top 100 large energy users has been executed, in order to examine their energy uses and their achievement of energy conservation programs. In addition, the follow-up audit should be performed next year to urge energy users to save energy and to gradually enhance energy saving rate.

Moreover, the energy audit program can also guide 2606 large energy users to fill out their energy audit declaration forms and assist them to set up their energy conservation goals and energy conservation plans. Furthermore, given the energy consumption and equipment efficiency data, researchers can analyze the energy consumption trend and establish energy use and efficiency database.

### **IV. Achievements of Energy Conservation**

#### **1. Current status of large energy users' energy conservation in recent three years**

In recent years Chinese Taipei has been actively urging large energy users to establish energy audit systems and energy diagnosis, waging an energy conservation awareness campaign and analyzing energy-saving achievements. Currently there are 2,606 large energy users. Figure 1 shows the energy-saving rates of large energy users of main industries from 1999 to 2001.

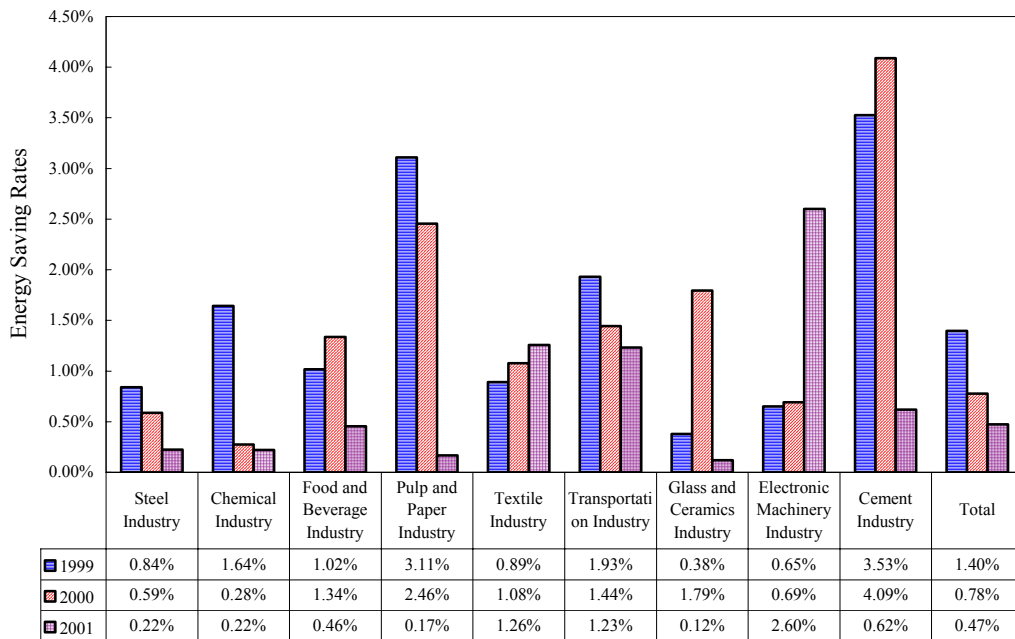


Figure 1 Energy Saving Rates of Large Energy Users of Main Industries 1999-2001  
(Source: Final Reports of Energy Audit Projects)

## 2. Current status of Top 100 large energy users' energy conservation in recent three years

Figure 2 shows the Top 100 large energy users' energy use share and energy saving rates in recent three years. The first half of the Top 100 large energy users have been finished for their on-site energy audit. As shown in Table 1, the total energy saving potential was 290,453 KLOE. Meanwhile, 40 out of the Top 100 large energy users which have been finished the on-site audit have been executed the follow-up audit. As shown in Table 2, the execution rate of suggested items for improvement is 63%. The amount of energy savings added up to 129,726 KLOE.

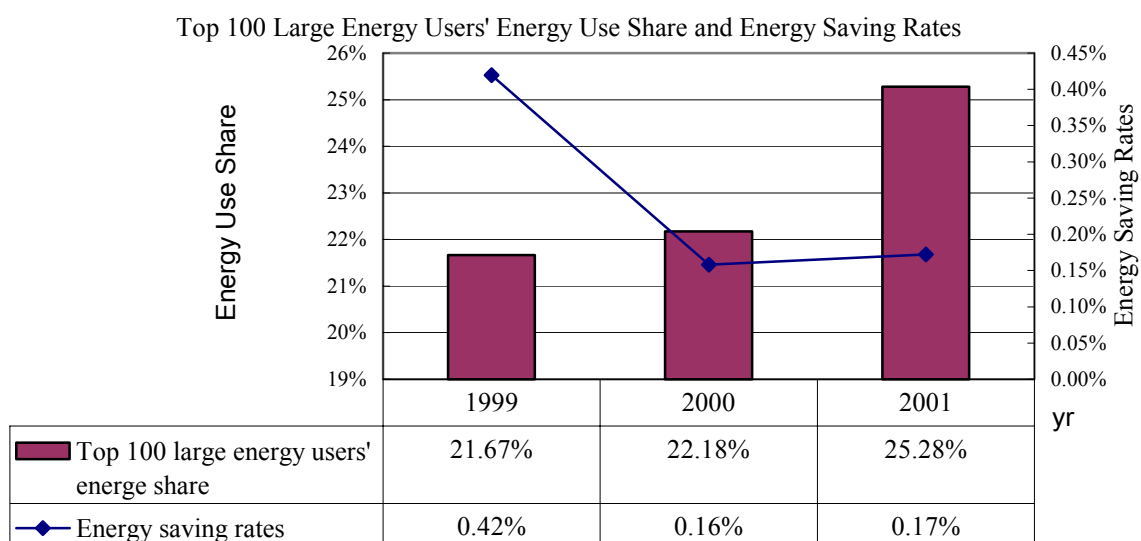


Fig. 2 Top 100 Large Energy Users' Energy Use Share and Energy Saving Rates in Recent Three Years(Source: Compilation of Energy Audit Program)

Table 1 Results of Finished On-Site Audit of Top 100 Large Energy Users

Industry	No. of companies	Target amount of energy saving declared (KLOE)	Energy-saving potential dug up from field examinations (KLOE)
Iron & Steel	9	22,907	36,626
Cement	11	10,994	56,619
Chemical	26	115,114	86,284
Pulp and Paper	10	30,605	75,101
Artificial fiber industry	12	2,764	32,847
Electronics & Electric Machine	5	1,613	2,721
Food and Beverage	1	7,227	132
Metal products	1	36	123
Total	75	191,260	290,453

Table 2 Result of Execution Follow-up for Top 100 Large Energy Users after On-Site Audit

Industry	No. of companies	Suggested Items for improvement	Items executed	Execution rate (%)	Total Energy Savings ( KLOE )
Iron & Steel	5	56	37	66.1	14,276
Chemical	15	176	107	60.8	27,843
Cement	5	30	12	40.0	2,685
Pulp and Paper	4	47	35	74.5	47,411
Textile	7	74	60	81.1	28,877
Food and Beverage	1	27	11	40.7	9.2
Non-Iron Metal	1	20	12	60	2,238.1
Electronics & electronic machine	2	24	14	58.3	6,387
Total	40	454	288	63.4	129,726.3

### 3. Achievement of on-site audit for other large energy users

Chinese Taipei has further performed the on-site audit on other 2506 large energy users to help them find out the potential energy savings since 2000. Up to now, 181 large energy users has been finished their on-site audit. The achievements of the on-site audit in recent three years are summarized in Table 3. As can be seen, the total energy savings for electricity, coal fuel, fuel oil and natural gas are 93.16 GWH, 25,009MT, 22,772KL and  $464 \times 10^3 M^3$ , respectively, amounting to 50,529 KLOE for energy savings.

Table 3 Achievements of On-Site Energy Audit of Other Large Energy Users in Recent Three Years

Year	No. of large energy users completed	Energy Conservation Potential				
		Electricity	Coal	Fuel oil	Natural gas	Total
		GWH	MT	KL	$10^3 M^3$	KLOE
2000	80	33.19	21,600	5,483	20	24,156
2001	80	36.16	3,409	12,826	420	19,513
2002	21	23.81	0	4,463	24	6,860
Total	181	93.16	25,009	22,772	464	50,529

## V. Conclusion

On account of lack of energy resources, almost all the energy used in Taiwan relies on imports; therefore, energy conservation remains a factor that must be taken

into account when the government is drawing up its energy policy and when the entrepreneurs are managing their business.

The achievements of energy audit executed by Chinese Taipei over the years are outstanding. In the future, Chinese Taipei will carry out a series of wider-ranging energy audit on high energy consuming public equipment, control the energy consumption status of the public equipment and provide energy conservation information and technology, in order to increase the full-scale energy efficiency and to achieve a better energy-saving result. Moreover, it will set up faster, more reliable industrial energy-consumption information, develop a computerized energy audit declaration system, enhance the reliability of the database of large energy users and construct an energy conservation information system; meantime, it will push ahead with energy conservation incentive activities to reach a comprehensive and complete energy saving purpose.